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ARCHAEOLOGY

Secrets of the Ohio Mound Builders

By EMMA REH STEVENSON

The greatest stone age artists the world has ever known once plied their trade in the green Ohio valleys long before the coming of the white man to America.

Unique in the history of mankind, these mound builders designed and sculptured so well that if they had been judged by art alone they would be placed much higher than in the stone age grade of civilization. This is the opinion of archæologists who have uncovered the scenes of their ancient culture.

The ancient mound builders sported million-dollar necklaces of genuine pearls and far outdressed their neighbors. They satisfied their love of display by wearing dazzling copper breastplates cut into intricate designs and studded with huge pearls. They dressed in finely woven materials of gayly colored patterns, trimmed in glittering appliques of mica.

"The mound building peoples belonged to the native American race, and the question of their origin is merely a part of the broader question of the origin of the American Indian," says Henry C. Shetrone, curator of archæology of the Ohio State Archæological and Historical Society, who has just returned from an exploration of the Hopewell mounds, one of the sites in southern Ohio where the great burial piles, or "pyramids," abound. "There is no evidence that the mound builders ever came into contact with the white man, but there is also no reason to believe that the building of mounds had ceased entirely when the Europeans appeared in that region," he adds. "It is quite possible that the great Iroquois conquest of very early colonial times may have hastened their extermination."

In the state of Ohio there were in prehistoric times three or more distinct types of mound building peoples. The most important of these



ARTIST'S CONCEPTION OF HOW A MOUND BUILDER might have looked, adorned in ornaments found in Ohio valley.

was the Hopewell group which flourished in the southern part of the state and left behind it a score or more great geometrical earthworks, and groups of mounds. Here, in a region now criss-crossed by railroad tracks and planted in corn, was the great social center of this mysterious and talented race, the relics of which have been recently brought to light.

Although the trimmings and trappings of the ancient Ohioans were in fine style and artistic beyond expectation, the tools and cooking utensils appear very much simpler and often crude in comparison. Fish hooks and harpoons identical with those used by the stone age people of Europe were used by certain of the prehistoric Indians in America. They also used the same sort of hammer stones, worn round by water in the brook.

One of the most striking discoveries made in years was the finding of enormous quantities of pearls in the graves and hiding places of these ancient peoples. What is now considered the finest prehistoric pearl necklace in existence has been recovered from one of the Hopewell mounds. The prize strand is thirty inches long and comprises more than 300 beads. The ancient Ohioans obtained these pearls from river clams and mussels which they used as food. Some of the necklaces are believed to date back perhaps to the beginning of the Christian era, and are marvelously preserved for their age. For all its years, one of the shorter strands of large pearls might easily pass for modern flapper "choker" beads.

The long prize strand is so beautiful that it could still be worn today. In fact, the Ohio State Archæological and Historical Society has been offered large sums of money for it. It is not for sale, however, says Dr. William C. Mills, director of the museum, but the person who

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Secrets of the Mound Builders

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would get it would have a unique and beautiful ornament to add to the family jewels. While it might be no rival to the Hope diamond, there would be nothing else like it in the world.

Another characteristic of the mound builders was their use of copper. Although they possessed small quantities of meteoric iron, some silver, and in one instance at least, gold, copper was their most important metal. They used large quantities of it in making breastplates, poker-shaped hair skewers, artificial noses, bracelets, rings, beads, ear ornaments shaped like large collar buttons, tools, and many other objects. They never learned to smelt copper nor temper it. The metal they used was native copper found in the form of nuggets which they hammered into shape. The hammering process hardened the metal and made it suitable for tools.

The largest prehistoric copper implement ever found in the world, as far as is known, is a 38-pound axe unearthed in one of the Hopewell mounds. It is too heavy and unwieldy for use as a tool and is thought to have been used for ceremonial purposes. The fact that these Indians used more of this malleable metal than other primitive people appear to have used might be explained by the fact that the copper resources of the United States are greater than those of any other country in the world.

A most peculiar use of copper among these Indians was in the making of artificial noses. A number of skeletons have been found in the burial mounds, upon which this feat of ancient plastic surgery had been performed. The Indians probably did not think the copper noses better than those that Nature supplied, but had learned from experience that the artificial one wore bet-

ter in the grave. Mr. Shetrone believes that the influential Indians in the community were outfitted at death with new noses to wear to Heaven.

Sacrificial knives, curved like a scimitar, and chipped from obsidian or volcanic glass, are among the numerous interesting objects recently found by the archaeological survey of the Ohio State Museum at the great Seip mound, near Bainbridge, Ross county.

While authorities on the Ohio mounds have found no evidence to prove that their builders practiced human sacrifice, the close resemblance of these sacrificial knives to those known to have been used by the Aztecs and other highly cultured peoples of middle America in their sacrificial rites appears to indicate some sort of affinity between the two, or at least the survival with the mound builders of Ohio of a trait acquired somewhere far to the southward.

Human sacrifice was practiced rather extensively by the Aztecs and Mayas of Mexico and Central America and by the Incas of Peru, but the custom is not known to have prevailed within the United States proper, with the single exception of the Pawnee of the southwestern country. The Pawnee formerly practiced human sacrifice to the extent of sacrificing a young woman on the occasion of a yearly ritual of religious significance.

Certain curved knives, chipped from obsidian, are believed to have been used by the Aztecs and others in administering the "coup de grace" to their sacrificial victims, and perhaps for the purpose of ceremonially removing the heart. The close analogy of the ceremonial knives found in the Seip mound with those of the Aztec country may be significant of relationship between the two

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Bell May Warn of Quake

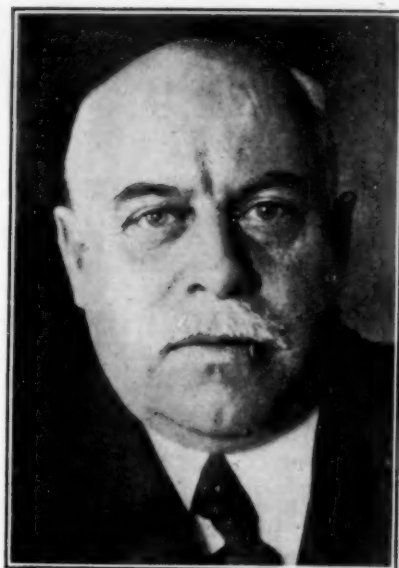
Earthquakes of the future may be heralded by the ringing of an earthquake alarm bell a few hours before the shock. In this way there would be time for an exodus from tall buildings and other places where the greatest loss of life is likely to occur.

That such an earthquake warning is not at all impossible is the statement made by John W. Evans, British seismologist, in a letter to the scientific magazine *Nature*. Investigations made by Prof. Akitune Imamura, leading Japanese earthquake expert, and presented by him at the recent Geodetic and Geophysical Union meeting in Prague, support his ideas.

The effect that Mr. Evans proposes to utilize is that of a tilting of the earth's surface which seems to happen usually a little while before a quake. In five Japanese earthquakes between 1793 and 1927, including the great quake of 1926 there was a lifting of the ground of a yard or two which preceded the quake by from half an hour to five hours.

By means of an instrument developed by another Japanese scientist, Ishimoto, a very slight tilting of the earth can be measured. So sensitive is this clinograph, as the instrument is called, that it will detect a tilting of the earth so slight as to move a pole a mile high only a fiftieth of an inch at its top. With an earthquake that occurred in Japan last spring, said Prof. Imamura, as quoted by Mr. Evans, this instrument showed a characteristic tilting which appeared from a few weeks to the day before the quake. About two and a half hours before the shock there was a rising of the ground of about a meter.

Mr. Evans suggests a chain of such stations for warning. "It would seem desirable," he says, "in regions subject to serious earthquakes, that a number of local stations should each be equipped with a pair of simple horizontal pendulums, so adjusted that if any unusual tilt occurs a bell should ring automatically in the office of a central observer and the locality indicated there by a signal. He would then judge from the number of stations affected, and the record of his own seismometer, whether the indications were sufficient to warrant him in giving the alarm.



GEORGE KIMBALL BURGESS

Standardizer

To think of science in connection with the United States Government is to think, in many cases, of the Bureau of Standards. In the years since it was founded, on March 3, 1901, this organization has performed such varied tasks as finding out how to obtain sugar from Jerusalem artichokes, testing the accuracy of electrical measuring instruments, making optical glass during the war when the former sources were closed, and measuring more accurately than ever before the constant of gravitation. It is looking after these diversified fields of endeavor performed by a staff of 850 people that constitutes the duties of Dr. Burgess. In addition, however, he is able to engage in his own researches on pyrometry and metallurgy.

When the Massachusetts Institute of Technology, in 1923, called Dr. Samuel W. Stratton, director of the Bureau from its founding, to become their president, they really made a fair exchange. For Dr. Burgess is himself an alumnus of the famous Cambridge institution, as well as a former member of its faculty.

Born in Newton, Mass., on January 4, 1874, Dr. Burgess received his bachelor's degree in 1896 from M. I. T. In 1901 his doctorate came from the University of Paris, for his own researches on the gravitational constant. After a few years of teaching, he went with the Bureau in 1903, where he has remained since.

Science News-Letter, November 19, 1927

Copper was used in Egypt almost 7,000 years ago.

New Egyptian Discovery

Archæologists digging at the entrance to what they believe is the tomb of the Pharaoh Zoser are probably on the verge of opening up a great chapter in the very ancient history of Egypt, according to a statement by Dr. James H. Breasted, noted authority on Egyptian antiquities, of the Oriental Institute.

"If the burial chamber of Zoser has at last been reached, and if the contents have survived, it will reveal the state of culture of Egypt at the beginning of the Old Kingdom, nearly 3,000 years before Christ, at the dawn of the age which produced the great pyramids of Gizeh," said Dr. Breasted.

The scene of the new discovery is Sakkhara, where for three years Cecil Firth, of Oxford, has been studying the area about the oldest of all the pyramids, for the Egyptian department of antiquities. This oldest pyramid was built for the Pharaoh Zoser by the great Egyptian architect Imhotep, who was the first man to design and construct buildings of stone. The pyramid is known as the step pyramid because it is made in six great steps.

Soon after he began digging about the base of the pyramid, Mr. Firth uncovered from the sand a group of chapels forming a temple, pronounced at once the oldest stone building in existence. This remarkable structure was the funerary temple of Zoser, his daughter, and his court. A statue of the king seated on his throne was found in one chapel, but the royal funeral chamber with its occupant and his possessions remained hidden. Last season, Mr. Firth came near to making what seemed to be the great tomb discovery.

"In the south wall of the enclosure surrounding the step pyramid, Firth discovered last year an immense masonry pit," said Dr. Breasted. "Clearance of the pit disclosed a descending stairway leading to several chambers connected by passages. The chambers were originally lined with beautiful green tile, which had later been barbarously hacked off by vandals. In the room at the foot of the stairway the excavators found gold covered poles and a funerary canopy, besides other furniture such as was placed with the Egyptian dead. All this pointed to an important burial, but the last chamber was not reached then be-

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Egyptian Discovery

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cause of the unsafe condition of the masonry."

At the present time, the excavations have been interrupted by a cave-in of a shaft but the investigation of the funeral chamber is to be resumed as soon as this can be remedied.

The first pharaoh to have a pyramid built for him is known today chiefly because of the genius of his architect, Imhotep. The uncovering of the temple of Zoser revealed that Imhotep used fluted columns many centuries before the Greeks made them famous. Imhotep was not only the royal architect and grand vizier, but also a learned physician, and many centuries later he was deified as the god of medicine. Whether his attempt to make a mighty and secure tomb for his royal patron was successful enough to keep out vandals and jewel thieves is expected soon to be revealed.

Science News-Letter, November 19, 1927

Few birds can keep up with a speeding express train.

The Brazilian rubber tree is related to the common castor bean.

Nearly 80 per cent. of the people in Great Britain live in cities.

The persimmon is the most widely used staple fruit of the far east.

Old-fashioned wick lamps are still used in over half the farm houses of the United States, judging by statements from 40,000 farm women.

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Jury to Settle Glozel Controversy

The lively and heated controversy among European scientists as to whether objects dug up in profusion at Glozel, France, are properties of very ancient man, or are less than 2,000 years old, or whether they are merely crude faked antiquities, seems at last about to be settled. An international commission consisting of M. Hamal-Nandrin, of Belgium; M. Pittard, of Switzerland; Senor Bosch-Gimpera, of Spain; M. Absalon, of Czechoslovakia; Miss Dorothy Garrod, of England; and M. Forrer, M. Peyrony, and M. Favret, of France, is investigating the whole Glozel situation, and Dr. A. Morlet, who has presided at the field where the vases, brick tablets, and other objects have been unearthed, has agreed to accept the verdict, favorable or not, of the investigation.

Meanwhile, reports have stated that a French farm boy buried the objects that have been accepted as genuinely ancient by some of the most noted French archaeologists. It has also been recently reported that a man named H. C. Rogers said that he planted the articles with the help of a French farmer.

On the other hand, the French government, not at all disturbed, has placed the site under the control of M. Peyrony, an eminent archaeologist, and has declared it a national historic monument.

The articles dug up at the Glozel farm by Dr. Morlet and Emile Fradin, whose father owns the land at the site, are very curious and remarkable. Some of the pottery vases are moulded to resemble grotesque faces, with handles like ears. Many of the small clay tablets are covered with cryptic marks, which some experts believe is a primitive alphabetic writing, perhaps the oldest writing ever discovered. Others, however, say it is a kind of Latin, and that the remains belong to the comparatively recent Roman Empire days. And other experts consider the whole collection of vases, tablets, stone axes, spindles, and carved pieces of horn a carefully prepared but crude fake.

Dr. George Grant MacCurdy, of Yale University, noted American authority on prehistoric man in Europe, and who is believed to be the only American archaeologist who has examined the site of Glozel, describes his visit in the following statement to Science Service:

"Mrs. MacCurdy and I visited Vichy and Glozel on June 9 and 10 last," said Dr. MacCurdy, "prior to opening the summer term of the American School of Prehistoric Research. Glozel is the name of the farm, some 23 kilometers southeast of Vichy, which belongs to the Fradin family.

"The morning we visited Glozel in company with Dr. Morlet (who can go to Glozel mornings only), the rain came down in torrents. We looked on while Morlet and Emile Fradin dug. They chose the spot, which was said to be the most productive at the moment. The trench was some 50 or 60 cm. deep.

"In a short time Fradin uncovered an implement of deer horn pointed at both ends. The next object, also found by Fradin, was a polished ax or celt of stone made of a pebble from the bed of a small stream known as La Vareille some 8 meters below and at the foot of the small terrace in which we were digging. As soon as the celt became visible, Dr. Morlet and Fradin invited me to take the digging knife and detach it; this I did with one hand, while holding an umbrella over myself with the other. The two specimens had been found within an hour and under such weather conditions as to make it practically impossible to say whether they had been found in situ or not.

"We then retreated to the farm house in order to see the Fradin collection of articles from the excavation. Our visit to Glozel ended with Dr. Morlet's return to Vichy at noon.

"I had expected to return later in the summer with the members of the School of Prehistoric Research, but later abandoned the idea because of Dr. Morlet's disinclination to allow 'students' to dig. I am therefore not familiar enough with the terrain nor with the specimens to make a definite pronouncement as to their authenticity.

"Some of them would look out of place among specimens, the authenticity of which cannot be questioned. But why prejudice a case, which is now in the hands of a duly appointed jury?

"While awaiting the verdict, a glimpse into the history of Glozel may not be out of place. Glozel

(Just turn the page)

New Germicide

A liquid germicide, known as S.T.-37, that destroys bacteria so quickly that the time in which the reaction occurs cannot be accurately measured, has been developed by Dr. Veader Leonard, assisted by Dr. William A. Feirer at the Johns Hopkins School of Hygiene and Public Health.

The new germicide has the selective capacity of killing even the most resistant bacteria in 15 seconds without injuring the most delicate tissues. The active agent responsible for this extraordinary germicidal power is hexylresorcinol, a synthetic chemical harmless to man but possessing over 7 times the germ-killing power of pure carbolic acid.

Hexylresorcinol was first developed in the Hopkins laboratories about three years ago. Since that time it has come into general use by the medical profession both here and abroad as an internal antiseptic. Dr. Leonard has continued his search, however, to find a way of "harnessing" his new compound so that it could be put to use as a general antiseptic.

After many experiments a solvent consisting of glycerine diluted with water was found that seems to answer all practical purposes. Dr. Leonard's research has thrown a great deal of light on the explanation of the great speed and efficiency of the hexylresorcinol's germicidal action.

"All fluids," he explained, "are endowed with a physical property known as 'surface tension.' This cohesive force, which can be measured accurately in tiny units known as dynes, is the force which makes

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PHYSICS

Radio Makes Glass Glow Red

Glass tubes, in which have been obtained one of the highest vacuums that man can attain, glow with a strange red phosphorescence under the influence of very short radio waves. This curious effect has been found by Prof. R. W. Wood and Alfred L. Loomis, working in the latter's laboratory, but as yet neither of them can explain just why it happens. They have reported their results to the British scientific magazine, *Nature*.

By means of one of the most powerful vacuum pumps ever made, and of which but a very few are in the United States, the tube is exhausted of air. Previously it has been thoroughly cleaned with chemicals, and it is continually heated as the air is re-

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New Germicide

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a fluid like pure water draw itself up into small separate drops on surfaces such as a window pane, instead of flowing out over the surface of the glass in a thin film. Pure water has a very high surface tension—namely, 77 dynes; and for this reason will not penetrate into tiny spaces into which fluids of low surface tension will readily flow. Now hexylresorcinol is so incorporated in Solution S.T.37 that the lowest possible surface tension is maintained—it amounts to only 37 dynes—a fact from which the name S.T.37 is derived. Being largely freed of this 'self-contracting' force, the solution is very penetrating. This allows the solution to come into contact with germs which may be lurking in the depths of tiny microscopic coverings—and which would otherwise escape destruction.

"Contact with the bacteria having been made, by means of this penetrating property, the same factor, low surface tension, now operates in two ways to speed up the destruction of the germ. In the first place, chemicals like hexylresorcinol which lower the surface tension of their solutions very powerfully are known to concentrate themselves very rapidly on the surface of any tiny non-crystalline particles with which the solution comes in contact. This phenomenon is known to the physicists as mechanical adsorption and hexylresorcinol shows it in high degree. Now it so happens that germs are non-crystalline particles and when brought in contact with S.T.-37 the hexylresorcinol immediately becomes concentrated on the surface of these germs. The agent which destroys them actually seeks them out and 'pounces' on them, so to speak."

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Makes Glass Glow

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moved. After the exhaustion has passed far beyond the point where a high voltage electric current through metal points inside the tube can cause a glow, the oscillating waves are applied. This is with a rather low voltage, and corresponds to radio waves of six or seven meters in length. Then the tube itself shines with a reddish glow.

It is believed that the glow is due to partly broken-up atoms of oxygen from the silicon oxide of which the glass partly consists.

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Glozel Controversy

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first came to the notice of prehistorians in Allier, France, early in 1924 when the school teachers of the department were invited to report on the archæology of their respective communes. Results of this inquiry came to M. Viple, public prosecutor at Moulins. The latter's published account tells of how he was attracted by the report of Mlle. Picandet, which mentioned for the first time the discovery made on March 1, 1924, by Fradin and his son Emile on their farm known as Glozel.

"Their plough uncovered a flagstone some 30 by 15 centimeters in crudely rectangular form and bearing the imprint of an extremely large human hand. Searching further on the spot, they found at a depth of about one meter, a flagging of brick placed in pairs horizontally on the soil for a length of 2.5 meters.

"M. Clement investigated the discovery; he was joined by Viple. After a number of visits to the site, Clement brought out a report in May, 1925. In this report, he abandoned the original idea of a sepulture for one of a furnace or oven of a glass founder.

"According to Viple the first brick or plaque with inscription had been found by Emile Fradin on the occasion of the first discoveries. The inscribed plaque had been placed in his garden; it was not until January, 1925, that he noticed the inscription. Clement's last visit to the place was in June, 1925. At this point, Dr. A. Morlet of Vichy appears on the scene as co-explorer with Emile Fradin. It seems that Clement had not personally discovered any specimens. Dr. Morlet and Fradin have had much better luck, as may be attested by the specimens in possession of Dr. Morlet at Vichy and the little Fradin museum at Glozel.

"Morlet's first paper was published privately in September, 1925. This fell into the hands of Van Gennep, prehistoric chronicler for the *Mercur de France*, in which journal a number of articles on Glozel have since appeared. Dr. Morlet took a series of originals to Paris and showed them to Boule, Jullian, Salomon Reinach, Breuil, Dussaud, et al.

"Among those who have actually visited the site are: Capitan, Breuil, Deperey, Esperandieu, Loth, Reinach and Vayson, to mention only French savants."

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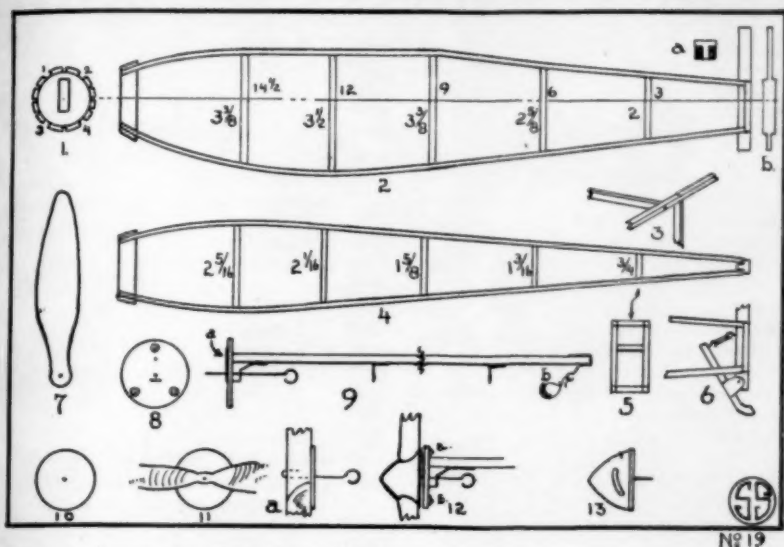
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Building and Flying Model Airplanes



This is the fourteenth of a series of articles by Paul Edward Garber, telling how to make model airplanes. Mr. Garber is in charge of aeronautics at the Smithsonian Institution.

Fuselage and Power Plant

After the wooden sticks which form the fuselage sides have thoroughly dried in their forms, they can be removed and assembled into a frame. They are to be jointed at the front to the nose piece the making of which was described in our last article. Four one-eighth inch grooves are to be cut in the periphery of this piece as shown in Figure 1, Nos. 1, 2, 3 and 4. These can be cut with a knife, burned with a hot piece of iron, or filed. They should be of such size that the longerons, or fuselage sticks, go into them flush with a tight fit.

The tail piece is next made. It is a piece of "T" section cut from a stick $3\frac{3}{4}$ inches long as shown in Figure 2, a and b, the latter being a rear view. The "T" flanges are left on the sides for a distance of $1\frac{1}{2}$ inches, $\frac{3}{4}$ inch from the bottom end. Figures 2 and 4 show a number of spars of different sizes separating the longerons. Two of each of these are to be cut from sticks $\frac{1}{8}$ inch square, then with all the requisite parts ready the frame is assembled. To do this the two sides are first made the spars being spaced as indicated by the figures above the center line which denote numbers of inches from the tail.

When the sides are completed they are joined together as shown in Figures 3 and 4. Figure 3 shows how the upper and lower spars are set in advance of the side spars. All of the joints are first touched with glue or ambroid and then nailed,

using No. 20 $\frac{1}{2}$ -inch brads. With all of the spars in place the tail piece is nailed and glued in position and finally the nose piece is similarly fastened.

This practically completes the fuselage but, in order to make it more nearly resemble the original, three $\frac{1}{16}$ -inch strips should be run down the length of each side and in addition short strips are run from the nose to the first upper and lower spar on top and bottom. These are to round out the fuselage, and slots for these strips are shown in Figure 1.

The tail skid is made from a piece of wood $\frac{3}{8} \times 3/16 \times 2\frac{1}{2}$ inches of the shape shown in Figure 6. A small piece of tin or aluminum sheet is bent around it and fastened with a nail for a pivot to the bottom of the tail piece. The upper end has a nail driven through it with the projecting end bent into an eye. A similar eye is formed in a nail driven through the tail piece, and a short rubber band is used to join the two eyes, thus giving elasticity to the tail skid to prevent breakage when the model is maneuvering on the ground.

We will next start on the power plant and the first move will be to put an extra cross brace into the stage 3 inches from the tail as shown in Figure 5. The brace is $\frac{1}{2}$ inch below the top and forms a box for the motor stick to rest in. We next make the propeller. Figure 7 shows the blade outline of the propeller. This shape is reproduced on cardboard to form a pattern. The blade is 5 inches long, and $1\frac{1}{4}$ inches wide. With this pattern proceed with the making of a ten-inch pro-

peller as explained in a recent article of this series.

Figure 8 shows a disc of thin plywood $1\frac{1}{2}$ inches diameter which is pierced with a slit and two holes so spaced that the bearing which you made last week will be accommodated therein as shown in Figure 9. The shaft hole must be exactly in the center of the disc. The long stick shown in Figure 9 is 15 inches long and $5/16$ inch square. To it the bearing is fastened by a nail driven through at "a" and a binding made where the strip joins the wood above the shaft hook. The tail hook and cans are lashed in place as shown.

Lindy's bus carried a spinner cap mounted on the propeller head resistance. We can make one as follows: Cut a piece of cardboard into a disc $1\frac{1}{4}$ inches diameter, Figure 10. This is now attached to the motor stick and shaft by passing the shaft through the disc and hub and bending the shaft over in the outside of the hub to retain it, Figure 11a. The spinner cap is formed of plastic wood, which is a new product resembling putty but working like wood. Most hardware and paint stores carry it. From it the nose is molded as shown in Figure 12 and in the end view, Figure 13.

For purposes of winding the motor and for making repairs the motor stick has been made separate from the fuselage. It is attached to it now by using dress clips. Three are spaced on the plywood disc and nose piece as shown in Figures 8 and 12. They can be fastened with small nails or wire or thread passed through the holes. Dress clips are sold at all notion stores in various sizes. The smallest should be used.

The fuselage is to be covered with China silk, using ambroid as adhesive. Each side and the top and bottom are covered separately, using a piece of fabric slightly larger than the frame, and applying it over the longerons and spars which have previously been coated with ambroid. The material must be stretched tight, and after it has dried all projecting edges must be trimmed off with a razor blade. The last section on the bottom near the tail is left open, because of the tail skid, and the top sections second and third from the front are left open because these spaces are covered with the wing. Fit the fabric neatly around the nose and tail post but leave no overlapping as this would interfere with the movement of other parts.

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SK	Hunting. Game protection.
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(Continued from page 322)

or of a common origin of their cultures.

Other interesting objects found by the exploration party comprise a highly artistic specimen representing a wild duck, with the head resting on the shoulders and back; implements of meteoric iron and copper; beads fashioned from bear claws and teeth; pearl and shell beads; and a dagger-like object of copper with an antler handle.

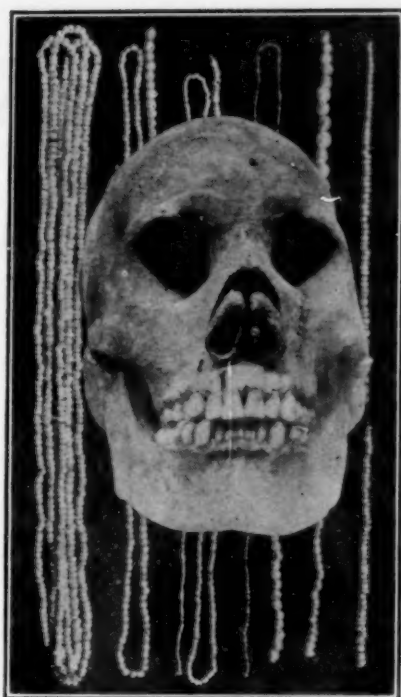
But for the use of copper, the prehistoric Indian might never have gained credit for another one of his noteworthy accomplishments. Under the dazzling copper breastplates, turned green and blue in the grave, pieces of cloth have been kept from decay for centuries by the preservative action of chemicals formed by the decomposing metal. Ancient Ohio drygoods stores must have contained at least four varieties of cloth, judging from the samples thus saved.

There was a plain cloth almost exactly like the home-spun linen of early pioneer days, and another type woven in colored patterns, of which samples remained. So far as is known no other race at the stage of civilization attained by the Ohio Indians ever produced a woven material in colored designs, Mr. Shetstone says.

A third type of goods was made from the bark of trees and shrubs, and a still coarser kind was woven from flat splints. All of these materials showed selvage edges like modern goods. The use of cotton and wool was unknown to the Indians and the fibers used came from grasses and weeds, it is believed. Botanists at the Ohio State University are now at work trying to identify the fibers used by the ancient weavers.

Small combs of precious marine tortoise shell, almost identical with the pocket comb in a modern girl's handbag, have been unearthed with one of the skeletons. Copper combs have been found.

The ancient Indians when dressed for "going out" or for ceremonial purposes were probably splendid creatures, judging from their ornaments and trappings. Teeth of the bear, wolf, elk, mountain lion and deer were perforated and used as beads, sometimes simply polished and at other times set with precious pearls, or carved in beautiful designs. Like the stone age dwellers of Eu-



PEARL NECKLACES taken from the Hopewell mounds and a skull showing the copper nose with which mound builders were equipped for their burial

rope, the American Indians also used tiny sea and fresh water shells for beads. One of the unique kinds of decorations used by the Indians, however, were designs of shimmering mica beautifully cut out. These are believed to have been used on their clothing, as breast plates or headdresses.

The art for which the mound builders are famous is best shown in many carved stone ceremonial pipes, amulets, charms and totems, found in the earthworks and buried along with the chiefs of the tribes. These stone objects carved in the round are probably the most perfect representations of animal and human figures ever found in primitive art, and the many flat designs from copper sheet and mica strips cut in conventionalized figures of familiar objects are the most sophisticated and symmetrical of their kind.

From a physical aspect alone, the most impressive structure of the Ohio valley mound builders is the famous serpent mound. If stretched out, the figure would be almost a quarter of a mile long.

The serpent figure was built to coil on the edge of a cliff which curves around the bend of a creek. The head, over forty-six feet long, is built in outline some three feet high, and rests upon a bare rock platform.

It is believed that an altar of some

kind was built in the center of the head, and was a place of worship for the mound builders.

Structures of the Ohio Indians in no way can compare with the pyramids of Egypt, but they are impressive, and a preacher who one time declared in a burst of rapture that this serpent mound proved that the Garden of Eden had been in the Ohio valley may therefore be pardoned.

In all, there are perhaps 10,000 of these mounds. Many of them are small and inconsequential, but many have never been explored. When it is considered that one of the burial mounds yielded searchers some two pecks of pearls—60,000 separate gems—it can be seen that exploration of these tombs is far from fruitless.

What the physical environments were that singled out one group of people on earth and fostered that unique talent is a question archaeologists would like to answer. The work on the Hopewell mounds is still far from complete. Although the excavations made to date have revealed unexpected riches and have enabled scientists to learn some of the secrets of Indian life before the dawn of history, the excavations planned for the coming year are expected to surpass those of the past. The story of a vanished civilization may thus be reconstructed.

Science News-Letter, November 19, 1927

ENTOMOLOGY

Anathema

There's something mean about a moth!

He poses as a butterfly,
And all his life's a horrid lie
Cut, if you get me, from whole cloth.

Mosquitoes play a forthright game;
They put you wise before they bite!
And many insects I might name
Do all their dark deeds in the light.
But oh, the moth! No other bug
Has his unholy appetite;
He lunches on your choicest rug
As soon as you are out of sight!

Assuredly it makes me wroth
To meet at every turn a-wing
My best golf knickers—new last Spring!
There's something mean about a moth!

—Edward W. Bernard,
In the New York Times.

Science News-Letter, November 19, 1927

Smoke columns were used for signaling by the ancient Chinese.

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Classics of Science: Grand Division of the Animal Kingdom



VERTEBRATE
North American

The following extract, from the introduction to Cuvier's monumental description of the likenesses and differences of every sort of animal then known, gives his plan of the first natural classification of animal life. The illustrations are reproduced from Cuvier's book.

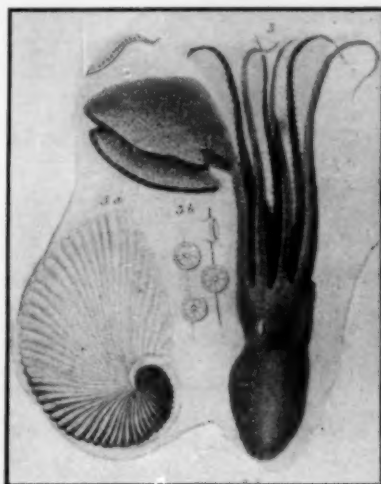
THE ANIMAL KINGDOM ARRANGED IN CONFORMITY WITH ITS ORGANIZATION, by The Baron Cuvier, tr. by Edward Griffith, London, MDCCCXXVII (1827).

General Distribution

If we divest ourselves of prejudices founded on the divisions of the animal kingdom formerly recognized, and consider animals without reference to their relative size or utility, our own degree of knowledge respecting them, or any other extraneous circumstances, we shall find that there are four principal forms after which all living beings appear to have been modelled. The basis of these distinctions is laid on the nature and organization of the several creatures themselves: -the ulterior divisions of them, with whatever names they may have been decorated, are but slight modifications of the primary: and consist entirely in the addition or development of certain parts which make no essential change in the general character of their conformation.

The Vertebrates

In the first of these general forms or models, including that proper to man, and the animals resembling him most nearly, the brain and the chief trunk of the nervous system



MOLLUSC
Argonauta argo

are enclosed in bony coverings, the former called the cranium, and the latter the vertebra. To the sides of the vertebra, as to a central column, are attached the ribs and the bones of those limbs, which form as it were the framework or carpentry of the body. The muscles, generally speaking, form a second covering for the bones which they put into action, and the viscera are enclosed in the head and trunk.

Creatures of this form are denominated "vertebrated animals," (*animalia vertebrata*.)

These have all red blood, a muscular heart, a mouth, with two horizontal jaws, distinct organs of vision, smell, hearing, and of taste, situated in cavities of the head, and never more than four limbs. The sexes in these animals are invariably separated, and a similar distribution prevails among them of the medullary masses, and of the principal branches of the nervous system.

On a close examination of each of the parts of this grand system we shall discover a general analogy of conformation even in the species most remote from each other; and can easily trace the gradations of the same plan from man to the lowest of the fish.

Molluscs

In the conformation peculiar to the second grand division of living beings, we find no skeleton. The muscles are simply attached to the skin which forms a soft and contractile covering, from which proceeds, in several of the species, a scaly or

position and production of which are analogous to those of the mucous body. Within this general *envelope* are the viscera and nervous system, which last is composed of many scattered masses, attached together by nervous threads. The chief of these masses placed in the oesophagus receives the denomination of the brain. Of the senses, properly so called, we can seldom distinguish, among these animals, more than the organs for those of taste and vision, and we sometimes find that even these are wanting. One family alone exhibits the organs of hearing. In other respects this division is characterized by a complete circulating system, and peculiar organs of respiration. The apparatus for digestion and secretion are scarcely less

(Just turn the page)

MEDICINE

Tularemia A Menace

Now that the season for rabbits has opened again, the American Public Health Association has issued a warning against tularemia, the rabbit disease that is sometimes transmitted to human beings.

Human cases of this disease which gains access by means of breaks in the skin or bites from flies or ticks, have been found in nearly every state in the Union. The New England states, New York, New Jersey and Delaware are the only localities which the disease has not yet invaded. In man it is characterized by swelling of the lymph nodes, fever and slow convalescence with disablement for many weeks or even months.

Any workers in an occupation in which rabbits are skinned, dressed or cut up are especially liable to the infection. Ticks and flies found on horses, cows and sheep may also carry it. Even when frozen, diseased rabbits remain infective for three weeks but are safe after four weeks. About ten per cent. of the rabbits on the market are infected according to officials of the U. S. Public Health Service who are studying the disease, but those which have been thoroughly cooked are safe to eat. Workers who have occasion to handle the infected animals are advised to wear rubber gloves. The eradication of the ticks, flies and rabbits that carry the disease is practically impossible. Ticks remain infected for life and are able to transmit the infection through their eggs to the next generation. No preventive vaccine or curative serum has been perfected and no drug has any special value in treating the disease.

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ARTICULATE
Serpula contortuplicata

complicated than are those of the laminous substance called shells, the vertebrata.

We give to the animals whose conformation is modelled according to this second form, the appellation of "molluscous animals," (*animalia mollusca*.)

Although the general plan of their organization is not so uniform as that of the vertebrata in relation to external configuration of parts, yet even here the degree of resemblance is generally analogous, both as to structure and functions.

Articulates

The third general form is that of insects, worms, etc. Their nervous system consists of two cords extending along the belly, and swelled out at regular intervals into knots or ganglia. The first of these placed on the œsophagus, though called the brain, is not much larger than the rest. The covering of their body is divided by transverse folds into a certain number of rings, the teguments of which are in some hard, and in others soft, but the muscles are invariably attached to their interior. We often find articulated limbs attached to the sides of the body or trunk, but it is as frequently destitute of any.

This division we denominate "articulated animals," (*animalia articulata*.)

It is in these animals that we can observe the transition from the circulating system in closed vessels, to a nutritive process performed by simple imbibition, and likewise a transition corresponding to this from the respiratory system in organs confined to certain parts, to the same operation performed through the



RADIATE
Echinus verticillatus

medium of trachæ, or air-vessels dispersed through the entire body. The organs of taste and sight are the most distinct among the articulated animals. A single tribe possesses those of hearing. The jaws of this division, when any are to be found, are invariably lateral.

Radiata

The fourth and last form comprehends the entire of those animals usually known under the name of zoophytes, and which may also be termed with propriety "radiated animals," (*animalia radiata*.)

In the three divisions preceding this the organs of motion and sensation are symmetrically disposed, as it were on the two respective sides of a certain axis. In this last, similar organs have a circular arrangement round a common center. The zoophytes, in truth, approach nearly to the homogeneous character of plants. They possess neither a nervous system sufficiently distinct, nor particular organs of sensation. In a few of them we may discover with difficulty, some vestiges of circulation. Their respiratory organs are generally upon the surface of the body. The intestines of the great majority consist of a sort of bag, through which there is no passage, and those which are lowest in the animated series exhibit nothing but a kind of homogeneous pulp possessed of motion and sensibility.

Georges Leopold Chretien Frederic Dugobert, Baron Cuvier was born August 23, 1769 at Montbéliard, and died May 13, 1832 in Paris. He began his studies of natural history at an early age, and at 27 became a lecturer at the Ecole du Pantheon, where he first stated his system of natural classification of animals. The *Règne animal distribué d'après son organisation*, in which it was published in complete form, appeared in 1817. From this edition the translation quoted above was made. Cuvier's work was based on his own very extensive researches in comparative anatomy of both fossils and living animals.

Science News-Letter, November 19, 1927

Say you saw it advertised in the *SCIENCE NEWS-LETTER*

BIOLOGY

NATURE RAMBLINGS

By FRANK THONE



Pumpkin

After the turkey has been stripped to his framework and the cranberry sauce and sweet potatoes and all the rest of the "fixin's" have departed with him, the Thanksgiving feast is appropriately rounded off with pumpkin pie. Even the least forethoughtful of small boys will have left a corner somewhere into which he can drive a wedge of it.

The fruit pie is a typically American dessert, and the pumpkin is a typically American pie material. Europeans know it not; they are abashed and embarrassed in its presence. There is a tale that a member of Sara Bernhardt's entourage once informed the great diva that pumpkin pie is "the American national cake." But it is as natural for an American to demolish pumpkin pie as it is for him to turn a deaf ear—or radio dial—to patriotic orators.

The typical farm scene, of orange-yellow pumpkins littered among dun-colored cornshocks, was American while the Pilgrim Fathers were still Englishmen. For the Indians cultivated corn and pumpkins together exactly as we do today, and when the white men came they learned this agricultural trick from the red men. Though there is little doubt that pumpkins originated on this continent, they are not known anywhere in the wild state. Like the corn they grow with, the Indians had them in cultivation but knew nothing of their source when the white man first arrived. Unlike corn, however, pumpkins have relatives all over the world, and the modern varieties have become much mixed with foreign stocks from Asia and Africa, which give us our amazing assortment of squashes, melons and gourds. But the yellow pumpkin that makes our pies is still of straight American ancestry.

ANTHROPOLOGY

Ancient Man in America

A little flint arrow point, such as primitive men used in hunting game, has been accepted by a number of scientists as real evidence that America was inhabited when mammoths and mastodons roamed this country, in the pleistocene period, at least 15,000 or 20,000 years ago. The arrow point was discovered beside a buffalo skeleton at Folsom, New Mexico, about two months ago, and it has remained untouched while experts on American Indians and experts on geology have visited the scene to express their opinions as to what story it really tells.

This is the first time that a tool used by man has been found beside a prehistoric animal and has remained undisturbed for careful scientific examination, according to Dr. F. H. H. Roberts, Jr., of the Bureau of American Ethnology, who has just returned from investigation of the remarkable discovery.

"It has been said that prairie dogs burrowing into the ground can push an object into old, deep layers of earth, where much older objects lie," said Dr. Roberts, "But in this case there are four distinct layers over the bones of the buffalo and the arrow. There are no prairie dog holes in the vicinity, and the layers are entirely untouched.

"The arrow lies close to a rib bone of the buffalo, in such a way as to indicate that it was in the animal at the time of death."

Four other arrow points were also found and bones of eight buffaloes were counted altogether in the pit, but some of this other material was moved in early scientific study of the site. The buffaloes were apparently caught in a bog while being pursued and sunk there to die.

The arrow points are beautifully chipped, Dr. Roberts reports. A unique feature is a hollow groove down the center of each flint. In the recent war, bayonets were grooved to cause greater bleeding, and it may be that the Stone Age Americans had this same idea.

The first discovery of prehistoric animals at this site was made two years ago by a cattle inspector who was passing the ravine and saw bones sticking out of the bank. He recognized them as buffalo bones, and sent specimens to J. D. Figgins at the Museum of Natural History, in Denver. Since then, Mr. Figgins and his assistants have made further discoveries and the site is still con-

sidered likely to yield further evidence of the same sort.

"There is no question that the arrow and the buffalo most recently found there came there together," Dr. Roberts concludes. "It remains for the geologists to determine the age of the deposits in which they occur."

Dr. O. P. Hay, paleontologist of the U. S. National Museum, who visited Folsom this summer and has examined some of the prehistoric buffalo bones found there, considers this discovery "one of the most certain pieces of evidence produced that man existed in America in the pleistocene period." From this and other similar finds Dr. Hay says that it seems impossible to believe that man has been in America only a few thousand years.

The buffalo bones are those of an extinct species, somewhat larger than modern buffaloes, and they may turn out to be a kind different from any heretofore known.

Science News-Letter, November 19, 1927

PSYCHOLOGY

Origin of Speech Lost

Quotation from *SPEECH: ITS FUNCTION AND DEVELOPMENT*—Grace Audrus de Laguna—Yale University Press (\$5).

No existing culture and no existing language is anywhere near primitive. The language of the lowest savages is ages old and bears in its structure the marks of an age-old evolution. The former hope of philologists, that they might by the comparison of different types of languages be able to place them in a developmental order, and so to trace a curve of evolution which could be followed back to its origin, has been wholly abandoned. Indeed, so far has the pendulum swung in the other direction, that a careful anthropologist like Boas not only denies that any language is superior to any other, but also seems to doubt that any existing language is more primitive in its structure than any other. We may be able in the future, from the now rapidly accumulating archaeological remains of early man, to reconstruct primitive culture in its essential outlines; but primitive language, unfortunately, leaves no record, being limited to the winged word, eked out perhaps by the no less fleeting gesture. It seems beyond the limits of the most sanguine hope to suppose that we shall ever have any direct evidence as to how primitive men spoke in the dawn of culture.

Science News-Letter, November 19, 1927

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Young People's Shelf of Science. Edited by E. E. Slosson.
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First Glances at New Books

THE ROMANCE OF REALITY—Beverley L. Clarke — *Macmillan* (\$2.25). The beauties and mysteries of modern science. The newest ideas in the physical sciences explained in a fresh and interesting way with plenty of homely illustrations of their application. Radio-active elements, structure of the atom, the nature of electricity, Einstein's theory of relativity, etc. With portraits of great scientists to add human interest. This informal treatment of modern physics and chemistry makes the book a convenient one for side reading in high school and college courses.

Science News-Letter, November 19, 1927

CURIOSITIES OF SCIENCE — Jean-Henri Fabre — *Century* (\$2.50). Though in many respects this book is considerably out of date, it will doubtless be welcomed by those numerous lovers of the writings of the great French popularizer of science.

Science News-Letter, November 19, 1927

EDUCATIONAL YEARBOOK 1926—International Institute of Teachers' College of Columbia University—*Macmillan*. In this, the third of a series of yearbooks, the student of education can find an account of the present status of the educational systems of thirty-seven countries, including the United States.

Science News-Letter, November 19, 1927

DAVID GOES TO BAFFIN LAND—David Binney Putnam—*Putnam*. The third book by this prolific young author, in which he tells of his trip last summer north of Hudson Bay.

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CHEMISTRY—W. H. Barrett—*Oxford Press*. A splendid chemistry text prepared especially for use in the English "public schools." It will be of interest to American science teachers in showing the high standards prevailing at these institutions.

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FLOWERS FOR EVERY GARDEN—Louise Bush-Brown—*Little, Brown* (\$1.75). A compact and practical little garden manual.

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SHRUBS—F. F. Rockwell—*Macmillan* (\$1). A great deal of useful information for the householder ambitious to beautify his place, packed into very small compass.

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INTRODUCTORY CHEMISTRY—Neil E. Gordon—*World Book Co.* (\$2.20). A high school text and laboratory manual combined. Several useful features are introduced such as a division into two parts, the first containing the minimum essentials for a high school course, the second a number of topics for additional study if time permits. Teachers will find this a great convenience, while the numerous illustrations showing interesting applications of chemistry, such as an aerial smoke screen, and portraits of chemists, make it attractive to the student.

Science News-Letter, November 19, 1927

A MAGICIAN OF SCIENCE—John Winthrop Hammond — *Century* (\$1.75). A new printing of this boy's life of Charles Proteus Steinmetz, which attests to its popularity.

Science News-Letter, November 19, 1927

THE ROCKEFELLER FOUNDATION ANNUAL REPORT—George E. Vincent—*Rockefeller Foundation*. A report of the activities carried on by the International Health Board with the cooperation of local governments in all the remote corners of the globe where acute health problems obtain. The campaigns to suppress hookworm, yellow fever and malaria are especially noteworthy.

Science News-Letter, November 19, 1927

TROUBLES WE DON'T TALK ABOUT—J. F. Montague, M.D.—*Lippincott* (\$2). Disorders of the intestinal tract discussed in simple language for the layman.

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WHAT EVERY BOY AND GIRL SHOULD KNOW—Margaret Sanger—*Brentano's* (\$1.50). Mrs. Sanger contributes her bit toward the safeguarding of the younger generation.

Science News-Letter, November 19, 1927

PRINCIPLES OF RURAL SOCIOLOGY—Gustav A. Lundquist and Thomas Nixon Carver—*Ginn*. Aims to show how rural conditions in the United States have come to be what they are. Of interest to all intelligent farmers as well as students of sociology.

Science News-Letter, November 19, 1927

THE INCOME AND STANDARD OF LIVING OF UNSKILLED LABORERS IN CHICAGO—Leila Houghteling—*University of Chicago Press* (\$2.50). A store of valuable facts gleaned from a unique study of family budgets.

Science News-Letter, November 19, 1927

PRIMITIVE MAN AS PHILOSOPHER—Paul Radin—*Appleton* (\$3). The author leaves little of the notion that "the poor Indian"—or any other savage—has an "untutored mind." Primitive man thinks in very much the same way as his more sophisticated brother; we have been deceived heretofore partly because he starts from different premises, partly because of our own prepossessions about him.

Science News-Letter, November 19, 1927

IN ASHANTI AND BEYOND—A. W. Cardinall — *Lippincott*. Travel in tropical Africa, while not exactly easy, is at least becoming possible to an increasing extent, and travel books such as Mr. Cardinall's are doing much to increase our stock of knowledge about the men, animals and plants of what we used to call the "Dark Continent."

Science News-Letter, November 19, 1927

THIS EARTH WE LIVE ON—Elizabeth W. Duval—*Stokes* (\$3). A geography for children, illustrated with attractive sketches in color.

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THE CLIFF DWELLERS OF KENYA—J. A. Massam—*Lippincott*. A very readable and informative account of the little known people of a most inaccessible region.

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BEAN CULTURE, RURAL SCIENCE SERIES—E. V. Hardenburg—*Macmillan* (\$3). The alpha and omega of beans: their botany, cultivation, diseases, marketing and utilization.

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LONGLEGS THE HERON—Thornton W. Burgess—*Little, Brown* (\$1.75). Another classic by the author of *Peter Rabbit*. Large print and illustrations in color make this an attractive volume for children just beginning to read for themselves.

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TOWARDS HEALTH—J. Arthur Thomson—*Putnam* (\$2). Explains in a more or less popular vein the biological ideas that underlie the study of health.

Science News-Letter, November 19, 1927

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